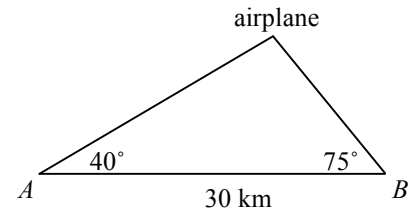


A Finely Crafted O'Brien Unit 5 Test

Calculator Section: You may use a calculator. Show all work and circle your answer. Use your time wisely; you will be able to earn additional credit after the timed portion of the test by completing Supercorrections. When you finish, put away your calculator and you can come up to get the non-calculator part- you may continue to work on both sections without your calculator.

1. Observers at points A and B , 30 km apart, sight an airplane at angles of elevation 40° and 75° respectively as shown in the diagram at right. About how far is the plane from each observer (to the nearest 10^{th} of a km)?



2. Find the exact value of $\sin(u + v)$ given that $\cos u = \frac{4}{5}$, $\sin v = -\frac{5}{13}$, and both u and v are in Quadrant IV.

3. Determine non-negative values of x less than 2π for which $2\cos^2 x + \sin x > 2$. Give your answer in exact form or to 3 decimal places of accuracy.

Bonus: (non-calculator- to be attempted after other work on the test is completed)

In triangle ABC, angle B has a measure of 45° , $AC = 2$, and $BC = \sqrt{6}$. Find all possible degree measures for angle A.

NON-CALCULATOR

Name: _____

4. True or false. If false, change the equation to make it true.

a. $1 + \tan^2 \pi = \csc^2 \pi$

b. $\tan 40^\circ (\cot 40^\circ) = 1$

c. $\sin 48^\circ + \cos 48^\circ = 1$

d. $\sin 2 = \cos 88$

e. $\cos(-20^\circ) = -\cos 20^\circ$

f. $\sin \frac{\pi^\circ}{4} = \frac{1}{\sec \frac{\pi^\circ}{4}}$

5. For one of the homework problems, the (correct) answer in the back of the book is $\sec x \csc x$. You and two classmates all get different answers. Which of them are correct? Show your reasoning.

a. $\frac{1}{\sin x \cos x}$

b. $\frac{\sec^2 x}{\tan x}$

c. $\cot x + \tan x$

6. Use a double angle identity to find the period and amplitude of the graph of $y = \sin x \cos x$.

7. Note: This question counts double. The second part can be done even if you get stuck on the first.

a. Prove the identity: $\cos 3\theta = 4\cos^3 \theta - 3\cos \theta$.

b. Use part a. to solve $\cos x = \cos 3x$ over the interval $0 \leq x < 2\pi$.

8. A parallelogram has two consecutive sides of lengths 8 cm and 10 cm respectively and an interior angle of 120° . Find, in simplest exact form, the length of the shorter diagonal